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Minimum Standards For School Buses In Montana



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Foreword

Minimum standards for school buses in Montana have been developed in accordance with the provisions of Sections 75-3308 and 75-3309, R.C.M., 1947, and were approved by the State Board of Education on November 27, 1967.

Appreciation is expressed to the Montana Highway Patrol, the Montana School Bus Drivers Association and all others who have assisted in the development of these standards. Recognition is also due the National Commission on Safety Education of the National Education Association for the use of materials utilized in this publication.

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Definitions

School Bus: Section 32-2102, R.C.M., 1947, defines a school bus as "every motor vehicle owned by a public or governmental agency and operated for the transportation of children to or from school or privately owned and operated for compensation for the transportation of children to or from school."

But for certain noted exceptions, the minimum standards which follow apply to all types of school buses:

- (a) conventional type body-on-chassis vehicles having an official rated seating capacity of 24 or more pupil passengers;
- (b) transit and metropolitan types of vehicles having an official rated seating capacity of 24 or more pupil passengers;
- (c) small vehicles (such as passenger automobiles, station wagons, suburbans, converted panel trucks, etc.) having a seating capacity to and including 23 pupil passengers.

In those instances when the basic minimum standard applies only to the conventional type body-on-chassis vehicles, minimums applicable to transit and metropolitan types of vehicles and/or to small vehicles are stated as exceptions. When a basic minimum standard applies to all vehicles except passenger cars, station wagons and suburbans, the exceptions are stated.

Minimum Standards for School Buses

THE BUS CHASSIS

Air Cleaner

Bus shall be equipped with adequate oil-bath or dry-element type air cleaner mounted outside passenger compartment.

Exception—rear engine transit vehicles

A multistage cleaner that eliminates foreign matter or a pre-cleaner in connection with the regular air cleaner shall be used. Air inlet to multistage cleaner shall not be located in air turbulent area at rear of vehicle and engine air must not be drawn from inside vehicle.

Axles

1. Front axle or other type of suspension assembly shall be of sufficient capacity at ground equal to or exceeding that portion of the total load which is supported by the front axle or other type of suspension assembly.
2. Rear axle shall be full-floating type and shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by the rear axle.
3. Chassis manufacturer's rating for each axle on each model used in school buses shall be furnished in duplicate by chassis manufacturer to the State Department of Public Instruction, Capitol Building, Helena, Montana.

Exception—small vehicles

Requirement in Item 2 for full-floating rear axle does not apply to small vehicles not specifically manufactured as school buses.

Exception—transit and metropolitan vehicles

1. Front axle shall be wide-track, heavy-duty bus type and shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by front axle.
2. Rear axle shall be full-floating, heavy-duty bus type and shall have gross weight rating at ground equal to or exceeding that portion of total load which is supported by rear axle.
3. Same as Item 3 above.

Battery

1. Storage battery, as established by manufacturer's rating, shall be of sufficient capacity to care for starting, lighting, signal devices, heating, and other electrical equipment.
2. No bus shall be equipped with battery of less than 70 ampere hours at 12 volts, measured at 20-hour rate.
3. a. Battery shall be mounted outside passenger compartment in adequate carrier and be readily accessible for servicing and removal, preferably from outside passenger compartment.

- b. If battery is not mounted under hood, it shall be mounted on left side of chassis frame so that center line of battery shall be 52 inches back of cowl, and no part of battery shall extend above top of chassis frame.

Exception—small vehicles

1. Same as Item 1 above.
2. No bus shall be equipped with battery of less than 50 ampere hours at 12 volts, measured at 20-hour rate.
3. a. Same as Item 3a above.
b. Item 3b does not apply.

Exception—transit and metropolitan vehicles

Item 3b does not apply.

Brakes

1. Four-wheel brakes, adequate at all times to control bus when fully loaded, shall be provided.
2. Foot or service brakes shall, at all times, be capable of stopping complete unit (i.e., weight with oil, water and full tank of fuel, plus body weight, plus driver's weight, without pupils) from speed of 20 miles per hour in not more than 30 feet, such distance to be measured from point at which movement of service brake pedal or control begins. Tests for stopping distance shall be made on substantially level (not to exceed plus or minus 1 percent grade), dry, smooth, hard surface having approximately .6 coefficient of friction and surface free from loose material.
3. a. Chassis shall be equipped with auxiliary brake (hand or parking brake) capable of locking rear wheels and capable of holding vehicle on any grade on which it is operated under any conditions of loading on a surface free from snow or ice. The auxiliary brake shall be of hand lever type and shall be manually operated. It shall be so mounted as to minimize danger of accidental release by pupils. Operating controls of such auxiliary brake shall be independent of operating controls of service brakes.
b. Under test conditions outlined in Item 2 above, auxiliary brake shall be capable of stopping vehicle from speed of 20 miles per hour in measured distance of 50 feet. It shall be capable of successfully passing engine stall test in low gear (not compound low gear).

4. If bus is equipped with full compressed-air brakes, vacuum-actuated power or assistor-type brakes, or compressed-air-over-hydraulic brakes:
 - a. Such installation shall be made by authorized representative of chassis or brake manufacturer and shall conform to recommendation of that manufacturer.
 - b. Hydraulic line pressure shall not exceed recommendation of chassis or brake manufacturer.
 - c. Total reservoir tank capacity (see Item d(1) below) shall be at least 2,000 cubic inches for full compressed-air systems, and at least 1,000 cubic inches for vacuum-actuated systems and for compressed-air-over-hydraulic systems.
 - d. Buses having full compressed-air systems shall be equipped with
 - (1) at least two reservoirs (or one vessel divided into two compartments) connected in series
 - (2) safety valve mounted on first reservoir to protect air-brake system against excessive air pressure and check valve mounted in optional location
 - (3) air gauge mounted on instrument panel to register air pressure in air-brake system
 - (4) audible low-pressure indicator to warn driver if air pressure in air-brake system falls below 60 pounds per square inch.
 - e. Buses having vacuum-actuated or compressed-air-over-hydraulic systems shall be equipped with check valve located between source of supply and reservoir.

Bumpers

Front Bumper

1. Front bumper shall be furnished by chassis manufacturer as part of chassis.
2. Front bumper must extend to outer edges of fenders at bumper top line (to assure maximum fender protection) and be of sufficient strength to permit pushing vehicle of equal gross weight without permanent distortion to bumper, chassis, or body.

Exception—transit and metropolitan vehicles

Same as above except that front bumper shall be furnished by body manufacturer.

Rear Bumper

1. Rear bumper shall be of pressed steel channel at least 3/16 inch thick and 8 inches wide (high).

2. It shall be wrapped around back corners of bus. It shall extend forward at least 12 inches measured from rear most part of body at floor line.
3. Bumper shall be attached to chassis frame in such manner that it may be easily removed, shall be so braced as to develop full strength of bumper section from rear or side impact, and shall be so attached as to prevent hitching of rides.
4. Rear bumper shall extend beyond rear most part of body surface at least one inch measured at floor line.

Exception—small vehicles

1. Rear bumper shall be furnished by chassis manufacturer as part of chassis.
2. Rear bumper shall be of sufficient strength to permit vehicle being pushed without permanent distortion to bumper, chassis, or body.

Exception—transit and metropolitan vehicles

Rear bumper shall be of sufficient strength to permit fully loaded vehicle being pushed without permanent distortion to bumper or body. It shall be so designed as to prevent hitching-to or riding-on and shall be long enough to protect full width of body.

Clutch

All chassis of 40 through 60 pupil capacity having mechanical type transmission shall be equipped with clutch of 12 inch minimum diameter. Chassis of 66 and greater pupil capacity having mechanical type transmission shall be equipped with clutch of 13 inch minimum diameter or clutch of equivalent performance.

Color

See identification and color, page 20.

Drive Shaft

Drive shaft shall be protected by metal guard or guards to prevent it from whipping through floor or dropping to ground if broken.

Exception—small vehicles

Standard does not apply to vehicles with torque-tube drive shaft.

Electrical System

1. Battery—see page 1.
2. Generator or alternator—see page 6.
3. Lamps and signals—see page 22.
4. Wiring—see page 34.

Engine Compartment

Engine compartment shall be insulated to minimize heat and noise transfer, and fire hazard.

Exception—rear engine transit vehicles

Engine compartment shall be sufficiently enclosed for free passage of cooling air through radiator and across engine to air outlet or opposite side of vehicle.

Exhaust System

1. Exhaust pipe, muffler, and tailpipe shall be outside bus body and attached to chassis.
2. Tailpipe shall be constructed of seamless or electrically welded tubing of 16-gauge steel or equivalent.
3. Size of tailpipe shall not be reduced after it leaves muffler.
4. Tailpipe shall extend to but not extend beyond rear bumper.
5. Exhaust system shall be properly insulated from fuel tank and tank connections by securely attached metal shield at any point where it is 12 inches or less from tank or tank connections.
6. In forested areas cab-side upturned exhaust pipes will be used if required.
7. Noise level shall not exceed 125 sones as measured by Beranek Armour-ATA Equivalent Tone Method.
8. Muffler shall be constructed of corrosion-resistant material.

Fuel Tank

1. Fuel tank shall have minimum capacity of 30 gallons, be made of 16-gauge terneplate or equivalent, and be mounted directly on right side of chassis frame entirely outside body.
2. Flexible gasoline- and oil-proof connection shall be provided at engine end of fuel feed line.
3. Tank shall be equipped with adequate baffles.
4. Engine supply line shall be taken from top of tank and it shall be adequately protected.
5. Drain plug of at least $\frac{1}{4}$ inch diameter shall be located in center of bottom of tank.
6. Fill-pipe cap shall be entirely outside passenger compartment. Fill-pipe cap shall be of such design as to minimize spillage of fuel when bus turns corners in either direction. If venting of fuel

tank is done other than through fill-pipe cap, cap shall be of non-vented type.

7. Fuel filter with replaceable element shall be installed between fuel tank and carburetor.
8. Fuel tank fittings or lines shall not extend above top of chassis frame rail.

Note: Measurements shown below are for guidance of chassis manufacturers and serve only to prevent need for replacement of original tank. The Montana Highway Patrolman concerned with state approval of vehicle need not consider them unless tank does not fit.

- a. Tank shall not extend in height above side member of chassis.
- b. Distance from center line of chassis to outside of tank shall not be more than 39 inches.
- c. Bottom of tank shall not be more than 14 inches below top of frame.
- d. Distance from cowl to front of tank shall be 42 inches minimum.
- e. Distance from cowl to center of fill-pipe cap shall be 57 inches.
- f. Distance from center line of chassis to center of fill-pipe cap shall be 44 inches with plus or minus tolerance of $\frac{1}{2}$ inch permitted.
- g. Center of fill-pipe cap shall be 1 inch below top of frame with plus or minus tolerance of $\frac{1}{4}$ inch permitted.

Exception—small vehicles

Fuel tank shall be mounted, filled, and vented outside body.

Generator or Alternator

Generator or alternator with rectifier shall have maximum output of at least 60 amperes (in accordance with Society of Automotive Engineers rating) with a minimum charging of 15 amperes at manufacturer's recommended engine idle speed (12-volt system), and shall be ventilated, and voltage-controlled, and if necessary, current-controlled. Dual belt drive shall be used with generator or alternator.

Note: If electrical load is increased through addition of heater motors, electric windshield wipers, defrosters, etc., refer to table Suggested Method for Estimating Generator Capacity.

Exception—small vehicles

Generator or alternator with rectifier shall have maximum output of at least 40 amperes with a 12-volt system, and shall be ventilated, and voltage-controlled, and if necessary, current controlled.

SUGGESTED METHOD FOR ESTIMATING GENERATOR OR ALTERNATOR CAPACITY

Constant Load		Intermittent Load	
Equipment	Approximate average current draw (amperes)	Equipment	Approximate average current draw (amperes)
Ignition	2.50	Right-hand driver's heater (one motor)	12.00
Head lamps (dual low beam)	8.40	Defroster fan	3.00
Tail lamps	1.18	Left-hand defroster	12.00
Eight alternately flashing signal lamps (2 lighted at once)	11.60	Right-hand defroster	12.00
Turn-signal units	3.00	Step-well and six interior dome lights	5.64
Clearance lamps	2.36	Two stop (brake) lamps	3.00
Flasher motor	3.00	Electric windshield wiper motor	7.00
Instrument panel	0.80	Electric fuel pump	3.00
Left-hand driver's heater (two motors)	24.00	Emergency door buzzer	1.00
Left-hand driver's heater (one motor)	12.00	Interior lamps in excess of four, added draw per lamp	0.90

(Note: Horn is not included because of its limited use.)

The above values show (in amperes) the approximate average draw of current for typical constant-load and intermittent-load equipment items. The draw for any specific item will vary depending on make and model of equipment. For more accurate values, the manufacturer's specifications should be consulted.

To determine the electrical load (in amperes) for a typical school bus, the following formula is recommended:

Constant load + 35% of intermittent load = total load.

Governor

Governor is permissible and where used shall be approved by chassis manufacturer.

Exception—transit and metropolitan vehicles

When engine is remotely located from driver, governor shall be installed to limit engine speed to maximum revolutions per minute recommended by engine manufacturer, or tachometer shall be installed so engine speed may be known to driver.

Horn

1. Bus shall be equipped with horn or horns of standard make, capable of producing sound level of 110 decibels when measured at point on axis of horn 3 feet from exit of horn.
2. Sound-level measurements shall be made with meter that complies with American Standard Z24.3-1944, or current revision thereof, as promulgated by American Standards Association, Inc.
3. Since obstructions in the sound path reduce the effectiveness of the horn, there is an advantage in mounting the horn outside of the body.
4. If louder horn is desired, it shall be capable of producing sound level of 120 decibels under conditions specified above.

Instruments and Instrument Panel

1. Chassis shall be equipped with following instruments and gauges:
 - a. speedometer which will show speed
 - b. odometer which will give accrued mileage including tenths of miles
 - c. ammeter with graduated charge and discharge or suitable light indicator
 - d. oil-pressure gauge or suitable light indicator
 - e. water-temperature gauge
 - f. fuel gauge
 - g. upper-beam headlamp indicator
 - h. air-pressure or vacuum gauge, where air or vacuum brakes are used.
2. All instruments shall be easily accessible for maintenance and repair.
3. Above instruments and gauges shall be mounted on instrument panel in such manner that each is clearly visible to driver in normal seated position.
4. Instrument panel shall have lamps of sufficient candlepower to illuminate all instruments and gauges.

Oil Filter

Oil filter of replaceable element or cartridge type shall be provided and shall be connected by flexible oil lines if it is not of built-in or engine-mounted design. Oil filter shall have oil capacity of at least 1 quart.

Openings

All openings in floorboard or firewall between chassis and passenger carrying compartment, such as for gearshift lever and auxiliary brake lever, shall be sealed unless altered by body manufacturer. (See Item 4b under Construction, page 14.)

Overall Length

Overall length of bus shall not exceed 40 feet. "No single bus, unladen or with load, shall have an overall length, inclusive of front and rear bumpers, in excess of forty (40) feet." Section 32-1123 (3b), R.C.M., 1947.

Exception—small vehicles

Overall Width

Overall width of bus shall not exceed 96 inches. "No vehicle unladen or with load, shall have a total outside width in excess of ninety-six (96) inches . . ." Section 32-1123 (1), R.C.M., 1947.

Passenger Load

1. Gross vehicle weight (i.e., wet chassis weight [oil, water and full tank of fuel], plus body weight, plus driver's weight of 150 pounds, plus weight of maximum seated pupil load based on not less than 100 pounds per pupil) shall not exceed maximum gross vehicle-weight rating as established by manufacturer.
2. Manufacturer's gross vehicle-weight rating shall be furnished in duplicate by manufacturer to the State Department of Public Instruction, Capitol Building, Helena, Montana.

Power or Grade Ability

1. Chassis must be so geared and powered as to be capable of surmounting 3.7 percent grade at speed of at least 20 miles per hour with full load (see Passenger Load) on continuous pull in direct drive.

- Grade ability is to be calculated using the following formula and table:

$$G = \frac{33750 \times \text{H.P.}}{\text{G.V.W.} \times \text{M.P.H.}} - 1.5 \quad \text{or} \quad \frac{\text{G.V.W.} \times \text{M.P.H.}}{\text{Rolling Resistance}} - 1.2$$

(for buses having seating capacity up to and including 67 pupils)
(for buses having seating capacity of 68 or more pupils)

Where G = Grade in percent

H.P. = Certified net horsepower delivered at road speed (M.P.H.)

G.V.W. = Gross vehicle weight (see table below)

M.P.H. = Miles per hour vehicle is driven

Rolling Resistance = 1.5 or 1.2 (depending on seating capacity of bus)

Pupil Capacity

36
42
48
54
60
66

Gross Vehicle Weight (G.V.W.)

Chassis (wet) plus 7,500 lbs.
Chassis (wet) plus 8,600 lbs.
Chassis (wet) plus 9,800 lbs.
Chassis (wet) plus 10,800 lbs.
Chassis (wet) plus 11,900 lbs.
Chassis (wet) plus 13,200 lbs.

Vehicles must be so geared as to be capable of surmounting a 3 percent grade at 20 miles per hour with full load or continuous pull. The loaded gross weight of the vehicle shall not exceed 250 pounds per certified net horsepower.

Shock Absorbers

- Bus shall be equipped with front and rear double-acting shock absorbers of adequate size.

Skid Chains

All school buses and small vehicles used to transport children to school (either district-owned or contracted) shall carry skid chains of proper size and in proper number determined by the Montana Highway Patrol. (Also, see Wheel Housings, page 33.)

Springs

- Springs or suspension assemblies shall be of ample resiliency under all load conditions and of adequate strength to sustain loaded bus without evidence of overload.

2. Springs or suspension assemblies shall be designed to carry their proportional share of gross vehicle weight in accordance with requirement for Weight Distribution as shown on page 12.
3. If rear springs are used, they shall be of progressive type or equivalent.
4. If leaf-type front springs are used, stationary eyes shall be protected by full wrapper leaf in addition to main leaf.

Exception—small vehicles

Springs that are regular equipment on vehicle to be purchased may be used.

Steering Gear

1. Steering gear shall be approved by chassis manufacturer and designed to assure safe and accurate performance when vehicle is operated with maximum load and at maximum speed.
2. Steering mechanism shall provide for easy adjustment for lost motion.
3. No changes shall be made in steering apparatus which are not approved by chassis manufacturer.
4. There shall be clearance of at least 2 inches between steering wheel and cowl instrument panel, windshield, or any other surface.
5. Power steering is permissible if approved by chassis manufacturer.

Tires and Rims

1. Tire and rim sizes, based upon current standards of Tire and Rim Association, shall be required. (Current standards may be obtained from Tire and Rim Association, 2001 First National Tower, Akron, Ohio 44308, or from tire manufacturers.)
2. In order to allow for reasonable tolerance, total weight imposed on any tire shall not be greater than 10 percent above current standard of Tire and Rim Association.
3. Dual rear tires shall be provided on all vehicles.
4. All tires on given vehicles shall be of same size and ply rating.
5. Spare tire, if required, shall be suitably mounted in an accessible location. If the spare tire is mounted underneath the bus at the rear of the bus, the carrier is to be supplied by the chassis manufacturer. If the spare tire is enclosed in a tire compartment, such

compartment is to be supplied by body manufacturer. If the spare tire is mounted inside the passenger compartment, the spare tire must be fastened securely to the floor of the bus.

Exception—small vehicles

Same as above, except that dual rear tires are not required.

Tow Eyes or Hooks

Tow eyes or hooks shall be furnished, front and rear, and attached so as not to project beyond the front or rear bumpers. Tow eyes or hooks attached to the bumpers (chassis) when requested by purchaser, shall be furnished by the chassis manufacturer. Removable tow eyes or hooks attached to rear of body when so requested by the purchaser shall be furnished by body manufacturer.

Transmission

1. Transmission shall be synchromesh or constant-mesh type. It shall be of sturdy construction, and input torque capacity shall be at least 10 percent above maximum net torque developed by engine. Its design shall provide not less than four forward and one reverse speeds.
2. Automatic transmissions are permissible.

Exception—small vehicles

Three-speed transmissions are acceptable.

Weight Distribution

Weight distribution of fully loaded bus on level surface shall be such that not more than 75 percent of gross vehicle weight is on rear tires and not more than 35 percent is on front tires.

Exception—transit and metropolitan vehicles

With engine inside front of body: If entrance door is ahead of front wheels, not more than 75 percent of gross vehicle weight shall be on rear tires nor more than 50 percent on front tires. If entrance door is behind front wheels, not more than 75 percent of gross vehicle weight shall be on rear tires nor more than 40 percent on front tires. With engine in rear: Not more than 75 percent of gross vehicle weight shall be on rear tires nor more than 40 percent on front tires.

Minimum Standards for School Buses

THE BUS BODY

Aisle

1. Minimum clearance of all aisles, including aisle (or passageway between seats) leading to emergency door, shall be 12 inches. (See Item 2f under Doors.)
2. Aisle supports of seat backs shall be slanted away from aisle sufficiently to give aisle clearance of 15 inches at tops of seat backs.

Exception—transit and metropolitan vehicles

With engine inside front of body: Minimum distance between stanchion at rear of entrance step-well and engine cover shall be 14 inches measured at floor level.

Exception—small vehicles

Small vehicles (passenger cars and station wagons) Items 1 and 2 do not apply.

Battery

See Item 3 under Battery on page 1.

Body Size

Bodies for conventional body-on-chassis type vehicles shall be limited to length and width such that the overall length of the bus shall not exceed 40 feet and the overall width of bus shall not exceed 96 inches. (See Overall Length and Overall Width, page 9.) Sizes are based on a minimum of 26-inch center to center seat spacing, 13 inches of allowable rump width per person and a center aisle width of 12 inches.

Book Racks

1. Book racks, if installed, shall be provided above side windows within range from front cross-seat to rear transverse seat except across or above emergency door.
2. Racks shall be free of projections likely to cause injury and must have front guard rail to prevent objects from falling.

Bumpers

See Bumpers, page 3.

Ceiling

See Inside Height and Insulation, page 21, and Interior, page 22.

Chains

See Skid Chains, page 10.

Color

See Identification, page 20.

Construction

1. Construction shall be all-steel or other metal with strength at least equivalent to all-steel as certified by bus body manufacturer.
2. Construction shall provide reasonably dustproof and watertight unit.
3. Bus body (including roof bows, body posts, and floor) shall be of sufficient strength to support entire weight of fully loaded vehicle on its top or side if overturned. It shall have sufficient frame members (strainers, stringers, etc.) in roof structure and corners to provide adequate safety and to resist damage on impact. As evidence that bus body meets this standard, manufacturer shall furnish, for each current body model, certification in duplicate that bus body meets School Bus Body Manufacturers' Association **Static Load Test Code for School Bus Body Structure**. Consideration of impact resistance shall be a prime factor in body design in compliance with **Code** requirements. Copies of **Code** shall be furnished in duplicate by School Bus Body Manufacturers' Association to the State Department of Public Instruction, Capitol Building, Helena, Montana.
4.
 - a. Floor shall be of metal at least equal in strength to 14-gauge steel and insulated with 3-ply waterproof plywood at least $\frac{3}{8}$ inch thick over the 14-gauge steel and under the floor covering.
 - b. All openings between chassis and passenger-carrying compartment made due to alterations by body manufacturer must be sealed. (See Openings, page 9.)

Exception—small vehicles

Item 3 does not apply to small vehicles not manufactured specifically as school buses.

Item 4a: Floor on small vehicles not manufactured specifically as school buses shall be manufacturer's standard.

Defrosters

Defrosters are required and they shall be of sufficient capacity to keep windshield, window to left of driver, and glass in entrance door clear of fog, ice and snow. This may be done by using fans or by taking heat directly from approved heater. If frost shields are

available, vehicles used for the transportation of school children may be provided with adequate frost shields on the rear windows and on both sides of the driver during periods when freezing weather can be expected.

Doors

1. Service door:

- a. Service door shall be power or manually operated, under control of driver, and so designed as to afford easy release and prevent accidental opening. When hand lever is used, no parts shall come together so as to shear or crush fingers.
- b. Service door shall be located on right side of bus opposite driver and within his direct view.
- c. Service door on buses of over 18 capacity shall have minimum horizontal opening of 24 inches and minimum vertical opening of 65 inches. Buses of 12 to 18 capacity shall have a minimum horizontal opening of 24 inches and a minimum vertical opening of 48 inches.
- d. Service door shall be of split type or sedan type. (Split-type door includes any sectioned door which divides and opens inward or outward.) If one section of split-type door opens inward and other opens outward, front section shall open outward.
- e. Lower as well as upper panels shall be of approved safety glass and shall be of such dimensions and placement as will permit the driver to see children waiting to enter the bus and the ground where children step off the bus. (See Item 1 under Windshield and Windows, page 33.) Top of upper glass panel shall not be more than 6 inches from top of door.
- f. Vertical closing edges shall be equipped with flexible material to protect children's fingers.
- g. There shall be no door to left of driver. (This shall not be interpreted to conflict with Item 2a below.)

2. Emergency door and emergency window:

- a. Emergency door shall be located in center of rear end of bus or in rear half of left side of bus if engine is so located as to make it impossible to place door in center of rear end.
- b. Emergency door shall have minimum horizontal opening of 24 inches and minimum vertical opening of 48 inches measured from floor level.
- c. Emergency door shall be hinged on right side if in rear end of bus and on front side if on left side of bus. It shall open outward and shall be labeled inside to indicate how it operates.

- d. Upper portion of emergency door shall be equipped with approved safety glass, exposed area of which shall not be less than 12 inches in height and 20 inches in width. (See Item 1 under Windshield and Windows, page 33.)
- e. There shall be no steps leading to emergency door.
- f. No seat or other object shall be so placed in bus as to restrict any part of passageway leading to either rear or left-side emergency door to opening smaller than rectangle of 12 inches in width and 48 inches in height, measured from floor level.
- g. When not fully latched, emergency door shall actuate signal which is either visible or audible to the driver by means of mechanism actuated by latch.
- h. Words "EMERGENCY DOOR," both inside and outside in letters at least 2 inches high, shall be placed directly above emergency door.
- i. If emergency door is located on left side of bus:
 - (1) Window at rear shall be designed as emergency exit and shall be no smaller than 16 inches in height and 54 inches in width on buses 80 inches or more in width; it shall be no smaller than 16 inches in height and 48 inches in width on buses less than 80 inches in width. Window shall be hinged from top and devised and operated to insure against accidental closing in emergency.
 - (2) Paneling is required to cover space between top of rear divan seat and inside surface of emergency window at rear.
- j. Words "EMERGENCY EXIT," in letters at least 2 inches high, shall be placed directly above emergency window on inside and directly below it on outside.
- k. Both emergency door and emergency window shall be designed to open from inside and outside bus and shall be equipped with fastening device which may be quickly released but is designed to offer protection against accidental release. Control from driver's seat shall not be permitted. Provision for opening from outside shall consist of nondetachable device so designed as to prevent hitching-to, but to permit opening when necessary.

Exception—small vehicles

Substitute following standards for those above:

- 1. Service door shall be located to right of driver and shall be manually controlled from driver's seat by over-center control for bus-type conveyance.

2. Emergency door:

- a. Emergency door shall be located in center of rear end of bus and shall be equipped with fastening device for opening from inside and outside body, which may be quickly released but is designed to offer protection against accidental release. Metal guard shall be placed over door control on inside. Control from driver's seat shall not be permitted. Provision for opening from outside shall consist of device designed to prevent hitching-to, but to permit opening when necessary.
- b. Door shall open either vertically or horizontally. When vertical-type door is used, there shall be unobstructed aisle at least 12 inches wide.
- c. Emergency door shall be marked "EMERGENCY DOOR" on inside.
- d. There shall be no steps leading to emergency door.
- e. No seat or other object shall be placed in bus which restricts passageway to emergency door to less than 12 inches.

Electrical System

1. Battery
See page 1.
2. Generator or alternator
See page 6.
3. Lamps and signals
See page 22.
4. Wiring
See Page 34.

Fire Extinguisher

1. Each bus shall be equipped with a fire extinguisher listed as approved under "B-2, C-2 Classification" of Underwriters' Laboratories, Inc., mounted in accessible place in full view.
2. The equipment must be kept full and in operating condition at all times.
3. Dry chemical-stored pressure fire extinguishers are to be used. It is recommended that the non-cartridge type extinguishers be used. These are available in two sizes: 2½ pound sizes for buses with capacity up to and including 48 pupils; and 5 pound size for buses of 49 pupil capacity and over.

First Aid Kit

Each bus shall carry a dustproof first-aid kit mounted in an accessible place in full view and approved by the Montana Highway Patrolman. The driver shall be instructed in its use. The kit shall

be kept fully equipped and in good condition at all times. The make-up of the kit is as follows:

16 Unit Kit for Vehicles of 9 Passenger Capacity or Less

Contents

Absorbent Gauze Compresses—1 per pkg.	1 pkg.
Waterproof Adhesive Bandages 1" (Band-Aids)—10 per pkg.	1 pkg.
Ammonia Inhalants—10 per pkg.	1 pkg.
Compress Bandage 4"—1 per pkg.	2 pkg.
Compress Bandage 2"—4 per pkg.	2 pkg.
Burn Ointment (Foilie)— $\frac{1}{8}$ oz. tubes—6 per pkg.	1 pkg.
Gauze Roller Bandage 4" x 6 yd.—1 per pkg.	1 pkg.
Gauze Roller Bandage 2" x 6 yd.—2 per pkg.	1 pkg.
Merthiolate Swabs—10 per pkg.	2 pkg.
Tourniquet & Forceps—1 each per pkg.	1 pkg.
Triangular Bandage 40"—1 per pkg.	2 pkg.
Wire Splint—1 per pkg.	1 pkg.

24 Unit Kit for Buses of 10 to 54 Passenger Capacity

Contents

Absorbent Gauze Compresses—1 per pkg.	2 pkg.
Waterproof Adhesive Bandage 1" (Band-Aids)—10 per pkg.	2 pkg.
Ammonia Ampoules with paper cups—4 per pkg.	1 pkg.
Ammonia Inhalants—10 per pkg.	1 pkg.
Compress Bandage 4"—1 per pkg.	3 pkg.
Compress Bandages 2"—4 per pkg.	3 pkg.
Burn Ointment (Foilie)— $\frac{1}{8}$ oz. tubes—6 per pkg.	1 pkg.
Burn Ointment (Foilie)— $\frac{5}{8}$ oz. tubes—2 per pkg.	1 pkg.
Gauze Roller Bandage 4" x 6 yd.—1 per pkg.	1 pkg.
Gauze Roller Bandage 2" x 6 yd.—2 per pkg.	1 pkg.
Merthiolate Swabs—10 per pkg.	2 pkg.
Paper Cups—10 per pkg.	1 pkg.
Tourniquet & Forceps—1 each per pkg.	1 pkg.
Triangular Bandage 40"—1 per pkg.	3 pkg.
Wire Splint—1 per pkg.	1 pkg.

36 Unit Kit for Buses of Over 54 Passenger Capacity

Contents

Absorbent Gauze Compress—1 per pkg.	3 pkg.
Waterproof Adhesive Bandages 1" (Band-Aids)—10 per pkg.	3 pkg.
Ammonia Ampoules with paper cups—4 per pkg.	2 pkg.
Ammonia Inhalants—10 per pkg.	2 pkg.

Compress Bandages 4"—1 per pkg.....	4 pkg.
Compress Bandages 2"—4 per pkg.....	4 pkg.
Burn Ointment (Foilie)— $\frac{1}{8}$ oz. tubes—6 per pkg.....	2 pkg.
Burn Ointment (Foilie)— $\frac{5}{8}$ oz. tubes—2 per pkg.....	2 pkg.
Gauze Roller Bandage 4" x 6 yd.—1 per pkg.....	2 pkg.
Gauze Roller Bandage 2" x 6 yd.—2 per pkg.....	2 pkg.
Merthiolate Swabs—10 per pkg.....	3 pkg.
Paper Cups—10 per pkg.....	1 pkg.
Tourniquet & Forceps—1 each per pkg.....	1 pkg.
Triangular Bandage 40"—1 per pkg.....	4 pkg.
Wire Splint—1 per pkg.....	1 pkg.

Floor

See Item 4a Construction on page 14.

Floor Covering

1. Floor in underseat area, including tops of wheel housings, driver's compartment, and toeboard, shall be covered with fire-resistant floor-covering material of type commonly used in passenger transportation equipment. Floor covering shall be of rubber or linoleum and shall have minimum overall thickness of 0.125 inch. (Linoleum floor covering shall be made with oxidized linseed-oil binder having cork filler and placed on burlap or felt backing.)
2. Floor covering in aisle shall be of aisle-type rubber or linoleum, non-skid, and wear-resistant. If of linoleum, or rubber without ribs, it shall have a minimum overall thickness of 0.125 inch. If of ribbed material, minimum overall thickness shall be .1875 inch measured from tops of ribs. (Linoleum floor covering in aisle shall be as described as in Item 1 above.)
3. Floor covering must be permanently bonded to floor and must not crack when subjected to sudden changes in temperature. Bonding or adhesive material shall be waterproof and shall be of type recommended by manufacturer of floor-covering material. All seams must be sealed with waterproof sealer.

Exception—small vehicles

Floor covering on small vehicles not manufactured specifically as school buses shall be manufacturer's standard.

Glass

See Windshield and Windows, page 33.

Heaters

1. Heaters are required. They shall be of hot-water or combustion type.

2. If only one heater is used, it shall be of fresh-air or combination fresh-air and recirculating type.
3. If more than one heater is used, additional heaters may be of circulating type.
4. Where hot-water heaters are used, they shall bear name plate rating of School Bus Body Manufacturers' Association **Standard Code for Testing and Rating Automotive Bus Hot Water Heating and Ventilating Equipment**, plate to be affixed by heater manufacturer. Copies of **Code** shall be furnished in duplicate by School Bus Body Manufacturers' Association to the State Department of Public Instruction, Capitol Building, Helena, Montana.
5. Hot water lines inside passenger compartment are to be enclosed or shielded to prevent passengers from getting scalded should connections break.
6. All combustion-type heaters shall be approved by Underwriters' Laboratories, Inc.
7. If combustion-type heaters are used, they shall be installed on new buses by body manufacturers and on buses now in operation by authorized dealers or by authorized garages.
8. Heaters shall be capable of maintaining inside temperature of 50 degrees Fahrenheit at average minimum January temperatures as established by the U. S. Department of Commerce, Weather Bureau, for area in which heater is required.

Identification and Color

1. With the exception of front fenders and lettering, school bus body including hood, cowl, and roof shall be painted uniform color, national school bus chrome,* according to specifications available from General Services Administration.

*NATIONAL SCHOOL BUS CHROME

The color known as National School Bus Chrome was designated as such by the 1939 National Conference on School Bus Standards. The National Bureau of Standards of the U. S. Department of Commerce assisted in developing this color and its colorimetric specification.

At the time of the 1954 National Conference on School Transportation, the color chips for National School Bus Chrome provided by the National Bureau of Standards were designated as follows: TT-C-595, #1305. Starting March 1, 1956, chips of the color that passes the same specifications for chromaticity and daylight reflectance as required for National School Bus Chrome were designated thus: Federal Standard No. 595, #13432. Color chips of the color now identified as #13432 are available at 5 cents each from General Services Administration, Business Service Center, Region 3, Seventh and D Streets, S. W., Washington, D. C. 20024.

C.I.E. Chromaticity coordinates		Daylight reflectance Y (%)			Dominant wavelength (in millicrons)			Excitation purity p (%)		
x	y	max.	std.	min.	max.	std.	min.	max.	std.	min.
.5211	.4549	—	41.	40.	584.5	583.5	582.5	—	93.7	89.0

Prepared by the National Bureau of Standards, Washington, D. C. 20024.

2. Rear bumper and lettering shall be black.
3. Body trim, if used, shall be black.
4. The area around the lens of each alternate flashing signal lamp and extending outward approximately 3 inches may be painted black.
5. Body shall bear words "SCHOOL BUS" in black letters at least 8 inches high on both front and rear of body or on signs attached thereto. Lettering shall be placed as high as possible without impairment of its visibility. Lettering shall conform to "Series B" of Standard Alphabets for Highway Signs.*
6. Words "STOP ON SIGNAL" shall be painted on rear of bus in letters at least 4 inches high. "STOP" by itself shall not be used.
7. Only signs and lettering approved by state law or regulation, limited to name of owner or operator and any number necessary for identification, shall appear on sides of bus.
8. When any school bus shall not be used for the transportation of school children but shall operate on the highways of Montana for personal use or for private hire, the words "SCHOOL BUS" and "STOP ON SIGNAL" shall be covered and concealed.

Exception—private passenger cars and station wagons

1. Items 1, 2, 3, 4, and 5 do not apply.
2. If signs painted on boards or metal are to be attached to top of vehicle, the body of the sign shall be painted National School Bus Chrome and the words "SCHOOL BUS" shall be in letters at least 8 inches high.

Inside Height

1. Minimum inside body height shall be 72 inches measured at any point on longitudinal center line from front vertical bow to rear vertical bow.
2. Buses 80 inches wide or less may have a 68-inch ceiling.
3. Panel trucks converted into school buses (seating capacity 12 to 18) must have minimum inside height of 48 inches.

Exception—passenger cars and station wagons

Standard does not apply.

Insulation

Ceilings and walls shall be insulated with proper materials to deaden sounds and to reduce vibrations. If thermal insulation is

*Designed by U. S. Bureau of Public Roads for Joint Committee on Uniform Traffic Control Devices. A full-scale layout (40 inches overall length) of words "SCHOOL BUS" as here specified, with suggestions for application, is available from National Commission on Safety Education, 1201 Sixteenth Street, N.W., Washington, D. C. 20036. Price 50 cents. One copy of this layout may be used repeatedly as guide for placing specified lettering on buses.

used, it shall be fire-resistant material of type approved by Underwriters' Laboratories, Inc.

Interior

1. Interior of bus shall be free of all unnecessary projections likely to cause injury. This standard requires inner lining on ceilings and walls.
2. Ceilings over aisles shall be free of all projections.

Lamps and Signals

1. All lamps and their installation shall conform to current standards and recommendations of Society of Automotive Engineers.
2. Head lamps: The bus shall be equipped with at least two headlamps with at least one on each side of the front of the vehicle and not more than four headlamps with at least two on each side of the front of the vehicle. Every headlamp shall be located at a height measured from the center of the headlamp of not more than 54 inches nor less than 24 inches from the center of the headlamp to the ground when the bus is standing on the level.
3. Clearance and side-marker lamps: The bus shall be equipped with at least 2 red clearance lamps at rear and at least 2 amber clearance lamps at front, mounted at widest portion of permanent body and as high as possible. Clearance lamps and side-marker lamps may be in combination.
4. Tail and stop (brake) lamps:
 - a. The bus shall be equipped with at least 2 tail or stop lamps or combination thereof which, when lighted, shall emit a red light plainly visible from a distance of 500 feet to the rear. Stop (brake) lamps shall have light intensity at least equal to Class A, Type 1 turn-signal units as established by the Society of Automotive Engineers.
 - b. These lamps shall be mounted at a height of not more than 72 inches nor less than 20 inches from the surface on which the vehicle stands. Stop (brake) lamps shall be as high as practicable but below window line, and spaced as far apart laterally as practicable but not less than 3 feet. Measurements shall be taken from lamp centers.
5. License-plate lamp: Bus shall be equipped with rear license-plate illuminator. This lamp may be combined with one of tail lamps.
6. Interior lamps: Interior lamps shall be provided which adequately illuminate aisle and step-well.
7. School bus alternately flashing red and amber signal lamps:

Definition: School bus alternately flashing red and amber signal lamps are lamps mounted at the same horizontal level as high and as widely spaced laterally as practicable working in an automatic integrated system, intended to identify vehicle as school bus and to inform other users of the highway that such vehicle is preparing to stop or is stopped on the highway for the purpose of receiving or discharging school children.

- a. Bus shall be equipped with signal lamps displaying to the front 2 red and 2 amber alternating flashing signal lamps and to the rear 2 red and 2 amber alternating flashing signal lamps. These lamps shall have sufficient intensity to be visible at 500 feet in normal sunlight. All flashing signal lamps shall be matching in size. Color shall be uniform for both the red and amber signal lamps and conform to current standards and recommendations of Society of Automotive Engineers. Each signal lamp shall flash alternately at rate of 60 to 120 cycles per minute. The exposed illuminated area of the lamp shall have no word or letters intended to identify the signal. Each lamp shall have a lens of not less than 6 inches and not more than 7 inches in diameter.
- b. There shall be a visible pilot light system located to give clear and unmistakable indication to the driver that the entire signaling system is operating correctly.
- c. Installation for new buses:
 - (1) The 2 front and the 2 rear red signal lamps shall be mounted as high and as widely spaced laterally as practicable, but in no case shall spacing between red signal lamp centers be less than 3 feet.
 - (2) The 2 front and the 2 rear amber signal lamps shall be mounted on the same plane as the red signal lamps and as close as possible to the red signal lamps. The 2 amber lamps shall be mounted closer to the center of the bus than the red signal lamps.
 - (3) Each signal lamp shall be mounted with its axis substantially parallel to longitudinal axis of vehicle.
 - (4) Location of front signal lamps shall be such that they can be clearly distinguished when headlamps are lighted on lower beam.
 - (5) Signal lamps shall be mounted at front above windshield and at rear so that lower edge of lens is not lower than top line of side window openings.
 - (6) Vision of front signal lamps to front and of rear signal lamps to rear shall be unobstructed by any part of vehicle from 10 degrees above to 10 degrees below horizontal and from 20 degrees to right to 20 degrees to left of center line of vehicle.

- (7) Area around lens of each alternately flashing red and amber signal lamp and extending outward approximately 3 inches may be painted black. In installations where there is no flat vertical portion of body immediately surrounding entire lens of lamp, circular or square band of black approximately 3 inches wide, immediately below and to both sides of lens may be painted on body or roof area against which signal lamp is seen (from distances of 500 feet along axis of vehicle).
- (8) Hoods, if used, may be single type or coupled into one unit. Hoods shall be of a minimum thickness of 20-gauge steel securely spot-welded to the housing or a minimum thickness of .100 of an inch plastic material securely bonded to the housing. The hoods shall extend at least 6 inches in front of the lens and from the vertical center-line of the lamp shall measure 80 degrees along the perimeter from each side of the center, with the center-line of the hood coinciding with the top of the vertical center-line of the lamp housing.
- (9) A circuit breaker or fuse shall be installed between the source of power and a master switch.
- (10) The amber signal lamps shall be actuated by the driver by means of a foot operated starter switch located conveniently near the clutch. Such switch shall be capable of carrying the necessary and proper current loads. Opening the entrance door shall automatically cut off the amber signal lamps and turn on the red signal lamps. Closing the entrance door shall automatically cut off the red signal lamps and recycle the system for the next stop. The pilot light system shall be on when the signal lamps are functioning properly and shall go off when one or more signal lamps shall fail to operate. No brake operated or manual controlled switches for the operation of school bus signal lamps shall be permitted. The entire signal system shall be designed so that should the driver fail to actuate the amber lamps, the red signal lamps shall automatically actuate upon opening the entrance door.
- (11) A master switch shall be provided so that signal lamps can be disconnected when the bus is to be stopped for reasons other than receiving or discharging school children.
- (12) All switches, relays, flashers, and wires used in the installation of school bus signal lamps shall be capable of carrying the maximum required current loads without heating or other fire danger.
- (a) Switches—All switches shall be capable of carrying

the maximum required current loads and all switches shall be mounted securely to prevent switch movement.

- (b) Relays—All relays shall be mounted in an enclosure and operate from the vehicular power system. Relays shall utilize a D.C. coil and all contacts shall be capable of continuously carrying the necessary amperage and voltage without significant pitting, erosion or tendency toward contact welding. Relays, when mounted vertically, shall withstand 10G's force in a vertical plane and contacts shall not open when energized. Relays shall withstand 5G's force in a vertical plane and not make contact when the coil is deenergized. All connections on the relay shall be screw type.
 - (c) Flashers—Flashers used shall be capable of operating at not less than 60 flashes and not more than 120 flashes per minute under normal operating conditions. They must be located on the bus in such manner that they may be replaced readily. Flashers used to operate school bus signal lamps may be of the motor driven or thermal type and so connected that the right and left lamps will flash alternately.
 - (d) Wires—All wires used in the installation of school bus signal lamps shall be of #10 gauge from the lamps to the door switch and #14 gauge wire for the remainder. The wiring used must meet the specifications as set forth in the current edition of the S.A.E. Handbook published by the Society of Automotive Engineers. The wiring should be protected in such fashion that it will be capable of withstanding severe abrasion. The wiring should be cleated at intervals so as to be properly supported. The edges of or holes in metal members into which the wire passes should be rolled or bushed with rubber grommets. Terminals shall be soldered to the ends of all wires or pressure type terminals shall be used at the points where connections are made to switches, flashers, relays, fuse blocks or circuit breakers. All other connections in the wiring system shall be soldered. Pressure type terminals shall be of the preinsulated type and shall withstand a pull pressure of 30 pounds.
- d. Installation for buses presently equipped with only 2 red flashing signal lamps displayed to the front and rear:
- (1) The amber signal lamps to be installed on buses now operating shall be either a sealed beam unit or a lamp containing a minimum of 50 candlepower bulb with reflectors. These lamps shall have sufficient intensity to be visible at 500 feet in normal sunlight. Amber lamps, in so far as possible, shall match the type and size of the vehicle's

present red signal lamps. The exposed illuminated area of the lamp shall have no word or letter to identify the signal. Each lamp shall have a lens of not less than 6 inches and not more than 7 inches in diameter.

- (2) The amber signal lamps shall be mounted as close as possible to the present red signal lamps. The amber signal lamps shall be mounted on the same plane as the red signal lamps or as close as possible and closer to the center of the bus than the red lamps.
- (3) Each amber signal lamp shall be mounted with its axis substantially parallel to longitudinal axis of vehicle.
- (4) The amber signal lamps shall be actuated by the driver by means of a foot operated starter switch located conveniently near the clutch. Opening the entrance door shall automatically cut off the amber signal lamps and turn on the red signal lamps. Closing the entrance door shall automatically cut off the red signal lamps and recycle the system for the next stop. There shall be a visible or audible means of giving clear and unmistakable indication to the driver when the signaling system is turned on. No brake operated or manual controlled switches for the operation of the red or amber signal lamps shall be permitted.
- (5) A master switch shall be provided so that signal lamps can be disconnected when the bus is to be stopped for reasons other than receiving or discharging school children.
- (6) All switches, relays, flashers, and wires used in the installation of the amber signal lamps shall be capable of carrying the maximum required current loads without heating or other fire danger.
 - (a) Switches—All switches shall be capable of carrying the maximum required current loads and all switches shall be mounted securely to prevent switch movement.
 - (b) Relays—All relays shall be mounted in an enclosure and operate from the vehicular power system. Relays shall utilize a D.C. coil and all contacts shall be capable of continuously carrying the necessary amperage and voltage without significant pitting, erosion or tendency toward contact welding. Relays, when mounted vertically, shall withstand 10G's force in a vertical plane and contacts shall not open when energized. Relays shall withstand 5G's force in a vertical plane and not make contact when the coil is deenergized. All connections on the relay shall be screw type.
 - (c) Flashers—Flashers used shall be capable of operating at not less than 60 flashes and not more than 120

flashes per minute under normal operating conditions. They must be located on the bus in such manner that they may be replaced readily. Flashers used to operate school bus signal lamps may be of the motor driven or thermal type and so connected that the right and left lamps will flash alternately.

- (d) Wires—All wires used in the installation of school bus signal lamps shall be of #10 gauge from the lamps to the door switch and #14 gauge wire for the remainder. The wiring used must meet the specifications as set forth in the current edition of the S.A.E. Handbook published by the Society of Automotive Engineers. The wiring should be protected in such fashion that it will be capable of withstanding severe abrasion. The wiring should be cleated at intervals so as to be properly supported. The edges of or holes in metal members into which the wire passes should be rolled or bushed with rubber grommets. Terminals shall be soldered to the ends of all wires or pressure type terminals shall be used at the points where connections are made to switches, flashers, relays, fuse blocks or circuit breakers. All other connections in the wiring system shall be soldered. Pressure type terminals shall be of the preinsulated type and shall withstand a pull pressure of 30 pounds.

8. Turn-signal units:

- a. Bus shall be equipped with Class A turn-signal lamps that meet specifications of Society of Automotive Engineers.
- b. Bus shall be equipped with lamps showing to the front and the rear for the purpose of indicating an intention to turn either to the right or left.
- c. When lamps are used for such purposes, the lamps showing to the front shall be located on the same level and as widely spaced laterally as practicable and when in use shall display an amber light visible from a distance of not less than 100 feet to the front in normal sunlight. The lamps showing to the rear shall be located at the same level and as widely spaced laterally as practicable and when in use shall display an amber light visible from a distance of not less than 100 feet to the rear in normal sunlight.
- d. Each turn-signal unit shall have a lens not less than 6 inches in diameter.
- e. These signals must be independent units and may be equipped with four-way hazard warning switch to cause simultaneous flashing warning.

9. Flags and flares:

- a. School bus shall be equipped at all times with at least three

red cloth flags not less than 12 inches square and means for mounting for use in warning traffic in event of prolonged stops on highway.

- b. Bus shall carry at least three liquid-burning flares or red electric lanterns, or at least three red emergency reflectors. Each flare and reflector shall be capable of being seen and distinguished at a distance of not less than 600 feet under normal atmospheric conditions at nighttime.
- c. Liquid-burning flares must be carried in leakproof metal box and carried outside body compartment.
- d. All flags and flares shall be approved by the Montana Highway Patrol.

Exceptions—passenger cars and station wagons

- 1. Item 3, clearance and side-marker lamps not required.
- 2. Item 7, school bus alternating flashing red and amber signals not required.
- 3. Item 8, turn-signal units on vehicles not manufactured as school buses shall be manufacturer's standard.

Pupil Capacity

As many forward-facing passenger seats as possible may be installed within usable space in bus, providing restrictions imposed by minimum standards affecting following items are observed:

- 1. overall length of bus;
- 2. overall width of bus;
- 3. seat center spacings;
- 4. allowable average rump width;
- 5. aisle width (including aisle between two seats leading to side emergency door);
- 6. restriction against use of portable and jump seats;
- 7. restriction against passenger seats on right side being placed ahead of driver.

Rear Vision

- 1. Interior mirror (clear or non-glare glass) shall be 6 by 30 inches overall, to afford good view of pupils and roadway to rear. If not metal-backed and framed, mirror shall be of laminated plate safety glass. It shall have rounded corners and protected edges.
- 2. Two exterior clear-view rearview mirrors shall be provided, one to left and one to right of driver. Area of each mirror shall be not less than 50 square inches overall. Each mirror shall be

firmly supported and adjustable to give driver clear views past left rear and right rear of bus.

3. Exterior convex mirror at least 7½ inches in diameter may be installed and may be located either left or right side of bus in such manner that seated driver may observe, through its use, areas to front or side of bus where direct observation is not possible.

Exceptions—passenger cars and station wagons

1. Interior mirror (clear or non-glare glass) shall be at least 4 by 5 inches.
2. Exterior mirrors shall be at least 4 inches in diameter.

Rub Rails

Two rub rails of ample strength to resist impact and to prevent body crushing shall be provided on each side of body. They shall be applied to full outside length of body: on left side from windshield post to rear corner radius and on right side from service door to rear corner radius. One rail shall be located approximately at seat line and one approximately at floor line. Pressed-in or snap-on rub rails do not satisfy this requirement.

Exception—small vehicles

Standard does not apply to small vehicles not manufactured specifically as school buses.

Sanders

Where required and used, sanders shall:

1. Be of hopper cartridge-valve type.
2. Have metal hopper with all interior surfaces treated to prevent condensation of moisture.
3. Be of at least 100 pounds (grit) capacity.
4. Have cover, on filler opening of hopper, which screws into place sealing unit airtight.
5. Have discharge tubes extending to front of each rear wheel under fender.
6. Have no-clogging discharge tubes with slush-proof, non-freezing rubber nozzles.
7. Be operated by electric switch with telltale light mounted on instrument panel.
8. Be exclusively driver-controlled.
9. Have gauge to indicate hoppers need refilling when they are down to ¼ full.

Seat Belt for Driver

Seat belt for driver shall be provided, belt to comply with current specifications and recommended practices of Society of Automotive Engineers except that belt shall be fastened to bus floor immediately behind driver's seat when adjusted to its rear-most position.

Seats

1. All seats shall have minimum depth of 14 inches.
2. Thirteen (13) inches shall be the allowable average rump width for use in determining seating capacity of the bus.
3. All seats shall be forward-facing and shall be securely fastened with bolts or rivets to that part or parts of bus which support them.
4. No bus shall be equipped with jump seats or portable seats.
5. Forward-most pupil seat on right side of bus shall be located so as not to interfere with driver's vision, not farther forward than guard rail behind driver or rear of driver's seat when adjusted to its rear-most position.
6. Minimum center-to-center seat spacing shall be 27 inches. Distance between driver's seat when adjusted to its rear-most position and front face of seat-back of forward-most pupil seat on left side of bus shall not be less than 24 inches measured at cushion height.
7. Padding and covering on all seats shall be of such materials as will not flash or explode upon contact with spark or open flame.
8. Minimum distance between steering wheel and back rest of driver's seat shall be 12 inches. Driver's seat shall have fore-and-aft adjustment of not less than 3 inches and shall be strongly attached.
9. Minimum of 36-inch headroom for sitting position above top of undepressed cushion line of all seats shall be provided. Measurement shall be made vertically not more than 7 inches from side wall at cushion height and at fore-and-aft center of cushion.
10. Backs of all seats of similar size shall be of same width at top and of same height from floor and shall slant at same angle with floor.
11. Where grab handles on seats are used, they shall be enclosed.
12. Fiber-glass seats may be used provided they meet the following standards:
 - a. Fiber-glass seats must meet all foregoing provisions for seats except those concerning construction of seat cushions and seat backs.

- b. Fiber-glass seats shall combine rigid construction of welded tubular steel with contoured matched die-formed or hand-sprayed molded plastic shell. Exposed steel shall be stainless steel or shall be finished with baked enamel.
- c. Plastic shall consist of good commercial grade, fire-resistant, color-pigmented resin reinforced with glass fibers in such manner as to avoid resin-rich sections. Shells shall be shaped to provide maximum comfort.
- d. Both metal frames and plastic shells shall have rounded corners and be free from sharp edges.

Exception—small vehicles

Substitute following standards for those above:

1. All seats shall be securely fastened to body of vehicle.
2. Seats shall be covered with fire-resistant padding material and comfortably upholstered with adequate padding.
3. Jump seats or portable seats shall not be used.
4. Seat beside driver, if regular equipment or installed by vehicle manufacturer, may be used for pupil seating. It shall be securely fastened to body and shall be so constructed as not to interfere with pupils entering or leaving vehicle.
5. Allowable average rump width in determining seating capacity of bus shall be 13 inches.
6. All seats shall be at least 14 inches in overall depth.
7. Forward-facing seats shall be so placed that distance from center to center measured at top center of backs shall be not less than 26 inches.
8. If longitudinal seats are used, only two shall be installed and distance between front edges of seat cushions shall be at least 20 inches.
9. Back rest for each longitudinal seat shall measure at least 8 inches vertically and shall be so mounted that its top edge is at least 12 inches above seat.

Skid Chains

See Skid Chains, page 10.

Stanchions and Guard Rails

1. Vertical stanchion shall be installed at right rear corner of driver's seat in such position as neither to interfere with adjustment of driver's seat nor to obstruct 12-inch aisle. Guard rail, approximately 30 inches above floor, and so placed as not to interfere with fore-and-aft adjustment of driver's seat, shall extend from vertical stanchion to left-hand wall behind driver's seat.

2. Stanchion shall be installed at rear of entrance step-well from roof to floor. Placement shall not restrict entrance passageway at any level to less than 24 inches nor aisle to less than 12 inches.
3. Guard rail and step-well guard panel shall be installed from step-well stanchion to right-hand wall to prevent children in front seat from being thrown into step-well in case of sudden stop. Guard rail shall be approximately 30 inches above floor and its guard panel shall not restrict entrance passageway to less than 24 inches at any level. Panel shall extend from guard rail to within 2 inches of floor. If panel extends over or into step-well opening, it must be flanged at floor line so as to close any opening between panel and floor.
4. Clearance between step-well guard panel and first pupil seat shall be at least 24 inches measured from panel to front face of seat back at cushion height.
5. All stanchions and guard rails shall be minimum of 1-inch outside diameter and of 18-gauge metal tubing or equal.

Steering Wheel

See Item 4 under Steering Gear on page 11.

Steps

1. First step at service door shall be not less than 12 inches and not more than 16 inches from ground, based on standard chassis specifications.
2. Riser of upper step at service door shall be not more than 15 inches. When more than two steps are used, risers must be within $\frac{1}{2}$ inch of equal height except that, where plywood floor is used on steel, differential may be increased by thickness of plywood used.
3. Steps shall be enclosed to prevent accumulation of ice and snow.
4. Steps shall not protrude beyond side body line.
5. Grab handle not less than 10 inches in length shall be provided in unobstructed location inside doorway.
6. Surface of steps shall be of non-skid material.

Exception—small vehicles

Steps (if any) on small vehicles not manufactured specifically as school buses shall be manufacturer's standard.

Sun Shield

Interior adjustable sun visor not less than 6 by 30 inches in size shall be installed above windshield.

Tools

1. Bus shall have tool compartment with cover and fastener and shall have such tools as may be necessary to make minor emergency repairs.
2. Bus shall have jack and tire tools.
3. Bus must be equipped with a shovel fastened securely inside passenger compartment.
4. Bus must carry an axe which is fastened securely to the bus body in a position easily accessible to the driver.

Ventilation

1. Body shall be equipped with suitable, controlled ventilating system of sufficient capacity to maintain proper quantity of air under operating conditions without opening of windows except in extremely warm weather.
2. Static-type exhaust roof ventilators shall be installed in low-pressure area of roof panel.

Exception—small vehicles

Standard does not apply to small vehicles not manufactured specifically as school buses.

Wheel Housings

1. Wheel housings shall be of full open type.
2. Wheel housings shall be attached to floor sheets in such manner as to prevent any water or dust from entering body.
3. Inside height of wheel housings above floor line shall not exceed 10 inches.
4. Wheel housings shall provide clearance for dual wheels as established by National Association of Chain Manufacturers.

Exception—small vehicles

Standard does not apply to small vehicles not manufactured specifically as school buses.

Windshield and Windows

1. All glass in windshield, windows, and doors shall be of approved safety glass, so mounted that permanent mark is visible, and of sufficient quality to prevent distortion of view in any direction.
2. Glass in windshield shall be heat-absorbent, laminated plate. Windshield shall be large enough to permit driver to see roadway clearly, shall be slanted to reduce glare, and shall be

installed between front corner posts that are so designed and placed as to afford minimum obstruction to driver's view of roadway.

3. Windshield may be horizontal gradient band starting slightly above line of driver's vision and gradually decreasing in light transmission to 20 percent or less at top of windshield.
4. Glass in all side and rear windows shall be of AS-2 or better grade, as specified in American Standards Association code Z26.1.
5. Each full side window shall provide unobstructed emergency opening at least 9 inches high and 22 inches wide, obtained by lowering of window.
6. Knockout-type split-sash windows may be used.
7. All exposed edges of glass shall be banded.

Exception—transit and metropolitan vehicles

1. Item 3. Full tint shading may be used but there will be not less than a 70 percent luminous transmittance of light.

Windshield Washers

Windshield washers shall be optional but, where required, they shall conform to body manufacturer's recommendations as to type and size for bus on which they are to be used.

Windshield Wipers

Bus shall be equipped with two positive-action windshield wipers of vacuum, air, or electric type.

Wiring

1. All wiring shall conform to current standards of Society of Automotive Engineers.
2. Circuits:
 - a. Wiring shall be arranged in at least 8 regular circuits, as follows:
 - (1) head, tail, stop (brake), and instrument panel lamps
 - (2) clearance lamps
 - (3) dome and step-well lamps
 - (4) starter motor
 - (5) ignition and emergency door signal
 - (6) turn signal lamps
 - (7) alternately flashing red and amber signal lamps
 - (8) horn

- b. Any of the above combination circuits may be subdivided into additional independent circuits.
 - c. Wherever heaters and defrosters are used, at least one additional circuit shall be installed.
 - d. Wherever possible, all other electrical functions (such as sanders and electric-type windshield wipers) shall be provided with independent and properly protected circuits.
 - e. Each body circuit shall be color coded and a diagram of the circuits shall be attached to the body in a readily accessible location.
3. A separate fuse or circuit breaker shall be provided for each circuit except starter motor and ignition circuits.
 4. All wires within body shall be insulated and protected by covering of fibrous loom (or equivalent) which will protect them from external damage and minimize dangers from short circuits. Whenever wires pass through body member, additional protection in the form of appropriate type of insert shall be provided.
 5. All light circuits shall be such as to provide, as nearly as possible, bulb design voltage at light-bulb terminals.
 6. Wires shall be fastened securely at intervals of not more than 24 inches. All joints shall be soldered or joined by equally effective connectors.

Exception—small vehicles

Wiring shall be manufacturer's standard.

Changes

No changes shall be made in the construction of a vehicle used for the transportation of school children which are not approved by the Montana State Board of Education, by and with the advice of the Supervisor of the Montana State Highway Patrol and the State Superintendent of Public Instruction.

Montana Statutes Governing School Bus Standards

The following sections of Montana law provide for the adoption of Minimum Standards for School Buses:

75-3308. Authority for regulating design, construction and operation of school buses. (1) That the state board of education, by and with the advice of the supervisor of the Montana highway patrol and the superintendent of public instruction, shall adopt and enforce regulations not inconsistent with the motor vehicle code and the minimum standards for school buses, adopted by the national commission on safety education to govern the design, construction and operation of all school buses used for the transportation of school children when owned and operated by any school district or privately owned and operated under contract with any school district in this state and such regulations shall by reference be made a part of any such contract with a school district.

(2) Every school district, its officers and employees, and every person employed under contract by a school district shall be subject to such regulations.

(3) These regulations shall include provisions that no person shall drive or operate, or be employed or permitted to drive or operate, any school bus who has not received and filed with the county superintendent of schools a certificate from the board of trustees of the school district for which the school bus is to be driven or operated, certifying the following:

- a. That he is at least twenty-one (21) years of age.
- b. That he is of good moral character.
- c. That he is the holder of a chauffeur's license.
- d. That he has filed with the board of trustees a satisfactory physical examination signed by a licensed physician in the state of Montana on a blank provided by the state board of education.

(4) The term "approved school bus" shall mean every motor vehicle owned by a public or governmental agency and operated for the transportation of children to or from school or privately owned and operated and under contract for transportation of children to or from school.

(5) Every approved school bus used for the transportation of school children shall bear upon the front and rear thereon a plainly visible sign containing the words "school bus" in letters not less than eight (8) inches in height. When a school bus is being operated upon a highway for purposes other than actual transportation of children either to or from school or for school functions, all markings thereon indicating "school bus" shall be covered or concealed.

(6) The Montana state board of education is authorized to adopt standards and specifications applicable to lighting equipment on and special warning devices to be carried by school buses,

consistent with the provisions of this act, but supplemental thereto; except that such standards and specifications may designate and permit the use of flashing warning lights on school buses for the purpose of indicating when children are boarding or alighting from any said bus. Such standards and specifications shall correlate with and, so far as possible, conform to the specifications then current as approved by the society of automotive engineers.

It shall be unlawful to operate any flashing warning signal light on any school bus except when any said school bus is preparing to stop or is stopped on a highway for the purpose of permitting school children to board or alight from said school bus.

History: En. Sec. 1, Ch. 183, L. 1947; amd. Sec. 1, Ch. 172, L. 1955; amd. Sec. 1, Ch. 68, L. 1961, amd. Sec. 4, Ch. 250, L. 1965.

75-3309. Penalty for violating regulations. That any officer or employee of any school district who violates any of said regulations or fails to include obligation to comply with said regulations in any contract executed by them on behalf of a school district shall be guilty of misconduct and subject to removal from office or employment by proceedings instituted in any court of competent jurisdiction by the county attorney of the county in which the school district is situated. Any person operating a school bus under contract with a school district who fails to comply with any said regulations shall be guilty of breach of contract and such contract shall be canceled after notice and hearing by the responsible officers of such school district.

History: Sn. Sec. 2, Ch. 183, L. 1947.

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